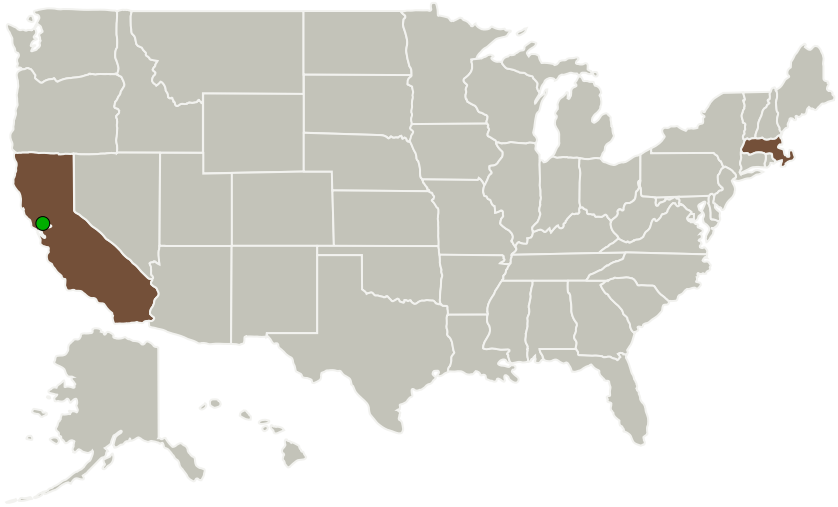
Frequency Modulated Integrated Cavity Output Spectroscopy: A General Technique for Trace Gas and Isotope Measurements with Unprecedented Sensitivity, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

A new technique is proposed for improved trace gas detection and measurement that combines the high absorption depths afforded by mid-infrared Integrated Cavity Output Spectroscopy (ICOS) with the added precision and sensitivity of Frequency Modulated Spectroscopy (FMS). To our knowledge, the two-tone FM technique described and prototyped in this proposal is the first demonstration of this combination. This proposal requests funding to advance on the breakthrough preliminary work shown here and to fully realize FM ICOS as a means to achieve one a one order of magnitude increase in detection precision compared to the very sensitive ICOS technique, enabling a new era of trace gas quantification including isotope ratio determinations of carbon, nitrogen and oxygen species.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
EOS Photonics	Lead Organization	Industry	Cambridge, Massachusetts
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

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Table of Contents

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Completed Technology Project (2011 - 2011)

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138177)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

EOS Photonics

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

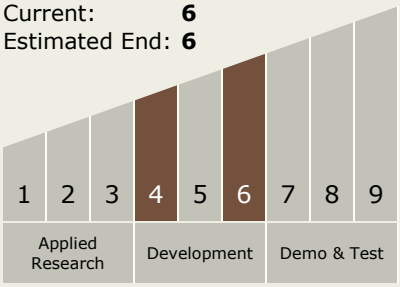
Carlos Torrez

Principal Investigator:

Mark F Witinski

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.1 Atmosphere Revitalization

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System